MODELLING PHOTOPOLYMERIZATION PROCESSES FOR ENHANCED PART QUALITY

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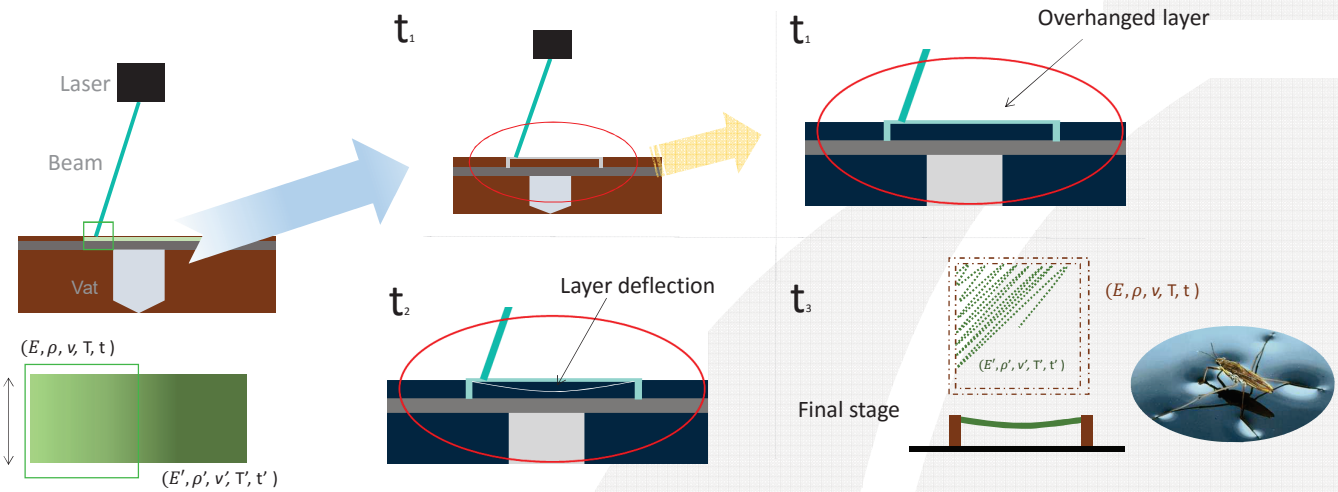
Abstract

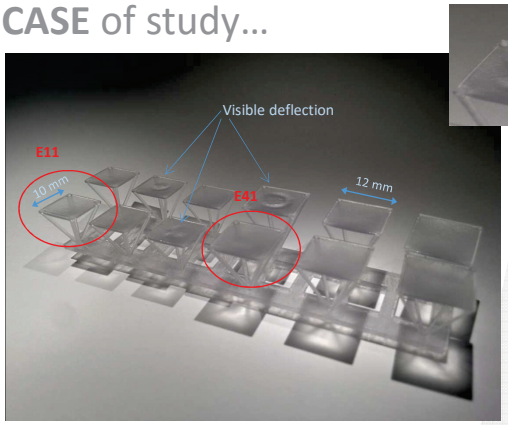
When laser paths cross or when new layers are cured on top of existing layers, residual stresses are generated as the cure shrinkage of fresly gelled resin is constrained forming deflection or curl of the layers.

The finite element method has been used to model the structural deformations arising from the stereolithography build process. This includes the first layer polymerized during printing of an overhanged layer as subsequent rows of tetra-elements. The model does not include any resin beyond the external boundaries of the solid part. A standard linear static solution is carried out in order to get the properties of the fresh-resin.

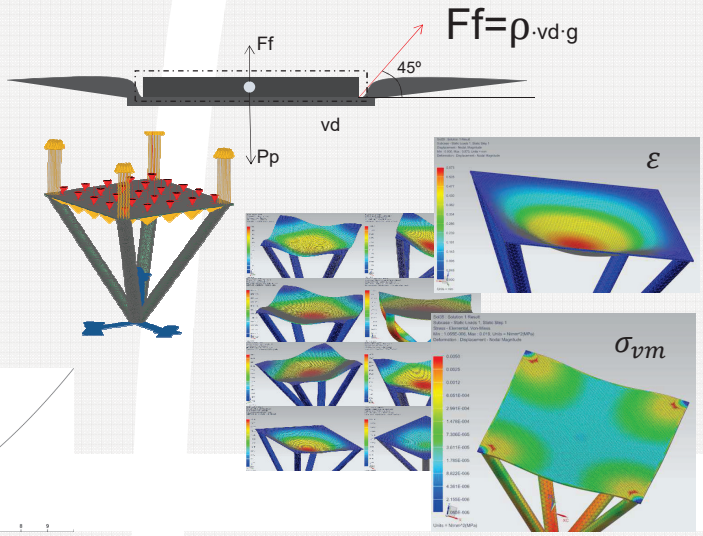
PROBLEMATIC: STABILITY OF FIRST OVERHANGED LAYER



CASE of study...



...FEM simulation



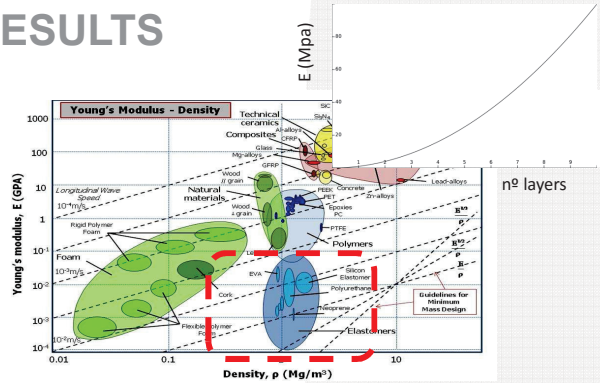
RESULTS

$E: (0{,}1 - 10) Mpa$

$\nu: 0{,}3$

$\rho: 1{,}18\ kg/mm^3$

$\sigma_{vm=0.005\ Mpa}$



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